



**RESEARCH
DEVELOPMENT
TEST AND
EVALUATION**

RDT&E

2019 HANDBOOK



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USTRANSCOM OVERVIEW

At every moment of every day, around the globe, USTRANSCOM's superb force of Soldiers, Sailors, Airmen, Marines, Coast Guardsmen, DOD civilians, and commercial providers accomplish a wide array of joint mobility missions. With its people, trucks, trains, aircraft, ships, information systems and infrastructure, USTRANSCOM provides the United States the most responsive strategic mobility capability the world has ever seen.

As the Joint Deployment and Distribution Coordinator (JDDC), USTRANSCOM orchestrates the execution of the strategic distribution system. The Command synchronizes the supply chain and related Information Technology (IT) systems as well as contracting authority for procurement of commercial transportation services. The Command also provides unmatched joint operational command and control enablers to joint force commanders conducting emergent full spectrum operations.

ABOUT THIS HANDBOOK



This handbook provides an overview of the USTRANSCOM RDT&E program. In support of the Command's Strategy, this program leverages emerging technologies to provide efficient global mobility and related capabilities to support the rapid projection of national power and influence.

This handbook highlights RDT&E strategic goals, describes technology challenges/areas of interest, provides samples of delivered capabilities, and summarizes currently funded initiatives. In addition, the handbook briefly describes related Technology Transfer (T2)/Office of Research and Technology Application (ORTA) activities.



PROGRAM STRATEGIC GOALS

The RDT&E program is a key element in the DOD's ability to improve supply chain management by enhancing joint logistics warfighting capabilities.

Goals:

- **Develop and deploy joint, relevant technologies to improve warfighter support while reducing costs**
- **Improve the precision, reliability, visibility and efficiency of the DOD supply chain**
- **Assure superior strategic, operational and tactical mobility support for the warfighter**

TECHNOLOGY CHALLENGES/AREAS OF INTEREST



To provide guidance to the Science and Technology community, USTRANSCOM has established several technology areas of interest. These areas of interest identify specific technological capabilities that will enhance USTRANSCOM's Unified Command Plan missions, IT strategies/roadmaps, address JDDE capability challenges, and support realization of USTRANSCOM's strategic priorities. The Command requires greater flexibility in adjusting the flow of integrated joint capabilities that support the dynamic plans of the Combatant Commands (CCMD). This includes responsive deployment and distribution planning and execution systems that accommodate capabilities-based force packaging and flexible deployment options. To receive USTRANSCOM funding consideration, initiatives must address a non-Title 10 responsibility, be consistent with available funding, and be executed in accordance with DOD Policies and Regulations.

Cyber Mission Assurance

Cyber and Electronic Security: USTRANSCOM and its components must be able to defend its information and detect and mitigate cyber and electronic threats against mobility platforms, networks, and C2 systems to continue uninterrupted operations. This requires a platform independent capability to secure deployment/distribution information resident in or traversing low assurance info networks/environments. This includes predictive analysis techniques/tools (e.g. AI, ML & CC) to dynamically assess future threats, attack vectors, and attacker intent and anticipate actions before they happen (i.e., the capability to defeat an attack before it happens, instead of having to react to it as it occurs). Capability must allow for assured, secure and trusted communications protected with Federal Information Processing Standard (FIPS) 140-2 compliant cryptography while also robustly withstanding or adapting to direct electronic attack. Solutions must require minimal management/infrastructure overhead, be able to integrate into existing DOD and commercial information systems, and leverage government-owned/operated capabilities to the maximum extent possible. Capability must enhance government collaboration in its ability to predict, detect, analyze, assimilate, mitigate, and deter cyber threats.

Cloud Computing: Explore, demonstrate and prototype a modern cloud computing environment which supports migration of multiple applications from current DOD environments. Goal is to show the utility of a vendor agnostic cloud computing environment which demonstrates the value of open architectures, modern tools and services while adhering to appropriate DOD Computer Network Defense Service Provider (CNDSP) security methodologies. Prototype environment must demonstrate and support these key areas of interest: business intelligence, analytics, rapid prototyping, performance dashboards, continuous development and testing, and containerization.

Big Data: USTRANSCOM lacks the ability to provide authoritative data at the Speed of War at the right time and place to drive informed decisions and operational effectiveness. Today's data environment has many independently managed data sources and no common standards, resulting in inconsistent outcomes that drive increased risk to operations and decision making. Ability to manage data as a strategic resource is foundational to USTRANSCOM's transformation to a data driven command and underpins implementation of business reform initiatives such as the implementation of a Transportation Management System. USTRANSCOM requires the definition, evaluation, and proposal of tools and implementation methodologies for Machine Learning (ML) and Artificial Intelligence (AI) solutions to support planning, analysis, operations, logistics, and real-time decision making for the JDDE. Includes but is not limited to advanced big data management; manipulation/integration of large data sets, discovery, predictive/ prescriptive analytics, and deep learning algorithm schema. Solutions must allow transparent access to, data mining of, and knowledge discovery in large, distributed, relational and non-relational databases; and ability to autonomously explore, analyze and identify trends and correlations between elements of large data sets to enhance data analytics and aid decision support, ML, AI, and cognitive computing.

Cyber Mission Assurance

Cross-Domain Information Exchange & Collaboration: The Command requires a secure means to transition information across multiple classification domains to enable process improvements and reduce system requirements. This includes interaction/interoperability with military/civilian partners which has grown in importance and immediacy with the shift in focus toward home basing and homeland defense posturing. Closer interoperability between non-traditional actors is key to preparing and responding to threats in a truly global manner.

Secure Collaboration with Commercial Partners: USTRANSCOM has interest in exploring concepts which minimize risk to passenger and cargo movement data on commercial scheduled or chartered plane, ship, truck, bus, barge, and rail services leaving the Defense Information Systems Network (DISN) and shared with commercial partners. Capability must allow for assured, secure and trusted communications protected with Federal Information Processing Standard (FIPS) 140-2 compliant cryptography. Solutions must require minimal management/infrastructure overhead, be able to integrate into existing DOD and commercial information systems, and leverage government-owned/operated capabilities to the maximum extent possible. Goal is to securely collaborate and share information with commercial partners while ensuring confidentiality, integrity, and availability of U.S. transportation data residing outside of the DISN.

Electronic Data Interchange: There is a need to assess the current state of how EDI is being used and then evaluate where there may be opportunities for future enhancement. Today USTRANSCOM and its components use electronic data interchange (EDI) to communicate with its industry partners. EDI continues to evolve/mature to meet requirements. The move towards a service-oriented architecture provides additional opportunities for EDI that did not exist previously.

Global Posture and Access

Sea Basing Technologies/Logistics-Over-The-Shore: Technologies and enablers to enhance the Joint Force Commander's flexibility to deploy and employ from/through a joint sea base as well as deliver and sustain warfighting capabilities at the point of effect. Enhancements should minimize the need to build up a logistics stockpile ashore and permit the forward positioning of joint forces for immediate employment. This includes autonomous technologies that facilitate the trans-loading and/or transporting of supplies and equipment in a sea base operation within a degraded or austere access environment. Solutions could include stealth capabilities to include under surface solutions, masking or other capabilities to minimize risk to the asset and subsequent delivery operations. Solution should provide protective or defensive capability to ensure asset can deliver its requirements in a hostile environment.

Rapid Construction for Points of Debarkation: To support the expeditionary nature of the Joint force, the JDDE requires an agile ability to rapidly assess, establish and secure ports of debarkation in contested and A2/AD environments.

Transportation Node Optimization: Warfighters need a single integrated view of force movement and sustainment planning requirements to provide a continuous and optimal balancing of total demand and capacity from plan inception to mission completion.

Convoy Security: The Theater Commander requires a variety of available lift asset options at his disposal to optimize distribution and best mitigate risks depending on Mission, Enemy, Terrain and Weather, Troops and Support Available, Time Available and Civil Considerations. There is limited ability to provide support for multiple, small, widely-dispersed detachments. Additional efforts in RDT&E in Counter-small Unmanned Aerial Systems (C-sUAS) are needed to help provide security for ground convoy security.

Mobility Aircraft: This challenge addresses anti-access concerns, ergonomically designed crew stations to reduce aircrew workload, assured global line of sight/beyond line of sight secure airborne voice and data communications to enable dynamic mission re-tasking while enhancing aircrew situational awareness, and modular concepts that allow for multiple configurations/missions with same/like airframe. Additionally, aging airlift and aerial refueling fleet present a need for technologies that increase the reliability of aircraft systems and structures to include electronic control systems and more reliable avionics packages that will increase aircraft availability and airlift capacity.

Global Posture and Access

Advanced Mobility Aircraft: Next generation mobility and air refueling aircraft to provide intra-theater maneuvers. This includes leveraging technologies used for hybrid and unmanned aircraft as well as next generation information, surveillance, and reconnaissance platforms. Advanced mobility aircraft capabilities will include future platforms that have more efficient airframes and engines, improved Command and Control (C2) and defensive systems capabilities, human integration and training, and have greater range, speed, payload, offload and access.

Aircraft/Ship Survivability: Advanced capabilities to increase aircraft/ship survivability, self defense, and enhance aircrew situational awareness (SA). Affordable, open system technologies are needed to detect and counter the full range of threats, navigate in contested environments, fuse onboard and off-board data for crew SA, and counter directed energy threats to crew and sensors. Additional efforts in RDT&E for Counter-small Unmanned Aerial System (C-sUAS) are needed to help provide aircraft survivability during landing and departures in both CONUS, OCONUS and expeditionary locations.

Opportune Landing Site Identification: All-weather airfield independence capability, leveraging various technologies to include AI/ML, focused on mobility aircraft to determine the security of a landing site for arrival and throughput operations without use of a pre-coordinated survey or on-site, ground party analysis.

Autonomous Approach and Landing Guidance: All-weather and lights-out taxi, take-off and landing capability, leveraging multiple technologies to include AI/ML for mobility aircraft operations from prepared and unprepared fields. Operations may require taxi, takeoff, and landing for aircraft under inclement weather conditions without assistance from navigation guidance systems that are commonly available at most U.S. airports.

Force Protection: Terrorism and asymmetric warfare pose an ever-present threat to our Nation's strategic mobility assets and their embarked cargo, equipment and personnel. This broad area of interest supports proposals to counter these types of threats. Of particular interest is the application of technology to create virtual borders at the point of loading, decontamination of transportation assets, and enhance seaborne and air cargo container standards. Screen cargo for smuggled goods as well as explosive, chemical, and biological threats. Technology interests are in those systems with stand-off, hand-held, robotic and/or unmanned vehicle inspection/detection capabilities (both on land and in the water) as well as fixed detectors to allow for the identification of potential threats before endangering personnel and/or resources. Interests include technologies that, when applied, detect access attempts and can be monitored for intrusion. Additional efforts in RDT&E for C-sUAS are needed to help provide A/C security while on the flight line and in hangers in both CONUS, OCONUS and expeditionary locations.

Transportation Capacity and Fleet Readiness

Delivery Technologies: Innovative solutions, to include autonomous, AI and ML technologies, that provide for the safe, accurate and timely delivery of joint forces and their sustainment within an Anti-Access/Area Denial (A2/AD) environment across a complex, distributed battlefield. This includes the re-supply of forces in austere conditions and in high threat areas, just two of the missions driving the need for more accurate and single-pass precision airdrop. This area applies to technologies to ensure survivability of aircraft and personnel on the ground while delivering cargo to a precise location within a high threat environment.

Rapid Distribution Technologies: Concepts and technologies, to include autonomous, AI and ML, that improve the end-to-end flow of military unit equipment and cargo through ocean ports, aerial ports and intermodal inter-change points, to include autonomous capabilities and motion compensation interface platforms, for use with commercial cargo vessels to enhance cargo throughput of military unit equipment at sea.

Interoperable, Multi-modal Patient Movement (MM-PM): Future contingency operations may result in significantly larger numbers of seriously injured casualties in denied areas, where PM requirements cannot be met exclusively with strategic airlift platforms and USAF Aeromedical Evacuation personnel and equipment. As a result, PM activities may be delayed, take place over longer distances, and require use of different transportation platforms and en route care capabilities than currently employed. USTRANSCOM needs viable solutions to provide MM-PM (air-, sea-, and ground-based) through the continuum of care to the CONUS support base under a variety of operational conditions (contested, permissive, cyber-degraded environments, etc.).

Fuel Efficiency: Mobility assets are the largest consumers of fuel within DOD. Seeking technologies that reduce the dependence and/or consumption of fossil fuels while maintaining or improving speed, flexibility, range, and responsiveness in contested environments.

Global C2 and JDDE Integration

Distributed Global Mobility C2: C2 is the heart of successful military endeavors. For global mobility, C2 must be seamless regardless of theater of operation and/or customer being supported. This includes technologies that allow distributed C2 with mobile platforms (whether on land, sea or in the air) as well as technologies, including AI/ML, that provide the capability to replicate large databases, in a synchronized fashion, across a globally distributed network. In addition, these enclaves must be capable of working “off-line,” then seamlessly rejoining the global network following combat or contingency degradation. Additionally, a capability that can plan, allocate and integrate logistics resources effectively and quickly on a global scale in support of the operational needs of the combatant commanders.

Resilient Communications: The JDDE needs technical solutions that address resilient and secure communications and networks, information infrastructure protection, and engineered systems. The objectives of the research are to provide secure, resilient, and assured communications over both wired and wireless networks to include highly mobile networks.

End-to-End Visibility: Stakeholders throughout the deployment and distribution process require the ability to determine shipment status (where has it been, where is it now, what threats may impact process, and what condition is it in) through system access at the beginning of a movement through the various nodes to the final destination/point of need. The availability of this information, ingest threat based analysis, contributes to inform decision making, confidence in the supply chain, and improve overall performance of the logistics processes. Although much asset visibility data resides in USTRANSCOM's Integrated Data Environment/Global Transportation Network Convergence (IGC) system, challenges remain in the effectiveness and efficiency of data capture, visibility of assets in-theater, and ability to create an enterprise view of the data. USTRANSCOM is interested in partnering with other organizations to provide solutions to overcome challenges relating to the integration of asset visibility data into appropriate business processes and system(s) to include, but are not limited to: advanced cryptology, distributed ledger technologies and artificial intelligence (AI).

Information Visualization: The Warfighter requires an integrated geo-referenced digital image map and dashboard view of logistics and transportation land, sea, air, and waterway operational information with drill-down capability into specific details such as capacity, capability and readiness of equipment, personnel, built and natural infrastructure, common intelligence picture of threats, and other assets at current or potential operating locations. Both mission planners and operators require this dual-faceted visualization of mission information to ensure diminished risk to warfighters and the mission.

Global C2 and JDDE Integration

Deployment/Distribution Modeling, Simulation and Optimization: Budget uncertainty and the evolving global mobility environment drive the need to modify our business processes, equipment and infrastructure. Currently USTRANSCOM is limited in its ability to weigh alternative courses of action and/or measure the effectiveness of the proposed changes. USTRANSCOM requires modeling & decision support tools to transform systems, programs, initiatives, and measure contested environment/attrition effects on transportation/logistics movement to ensure operational efficiency.

Predictive Forecasting: Seeking solutions, to include AI/ML, to enhance the warfighter's ability to more accurately forecast future logistics requirements. The JDDE lacks the capability to predict maintenance and logistics requirements to enhance operational needs and optimize the supply chain, both forward and reverse flow. Where predictive maintenance/logistics forecasting capabilities exist, they are not linked (machine-to-machine) to distribution and logistics support responses informed with analysis of emerging threat trends and adversary capability developments.

Distribution Planning and Forecasting: There is a lack of collaborative distribution planning, based on an understanding of aggregate customer requirements, for optimizing the JDDE. Require solutions, to include AI/ML, that synchronize planning, forecasting, modeling, and collaboration capabilities to ensure people, processes and assets are in place to execute planned operations.

Supply Chain Sustainment Simulation Tools: Joint simulation tools are poorly equipped to integrate sustainment flow modeling at the strategic and operational levels (wholesale and Service-level retail). Little capability exists to do unconstrained "what-if" supply scenarios without manual effort.

Automatic Identification Technology (AIT): USTRANSCOM is interested in partnering with other organizations in AIT solutions that improve logistics processes in a resourced-constraint budget environment. AIT and automated information systems (AIS) are two of the basic building blocks in DOD's effort to provide timely asset visibility in the logistics pipeline, whether in-storage, in-transit, in-process or in-theater. Specifically, AIT is used by a business AIS to capture the identity of materiel or packaging at each layer of consolidation to improve logistics processes. AIT also contributes to the track-and-trace capability within the Department's supply and distribution operations.

Global C2 and JDDE Integration

Process Management and Business Rules: Joint process descriptions and business rules either do not exist or are unclear for many key deployment and distribution processes. A lack of well-defined, integrated process descriptions causes shipment delays, wastes resources, and undermines efforts to streamline the supply chain. The lack of business rules creates organizational and communication breakdown and precipitates a lack of control. Additionally individuals spend large amounts of time combing through mountains of data, often stored in silo enclaves, to assemble pertinent information for decision-makers.

Joint Retail Inventory Interoperability: DOD cannot optimize customer requirements as it does not provide inventory interoperability across all Services and theaters. Information and material exchange across the DOD is inhibited by disparity of systems and insufficient interfaces. Inventory status and shipment information cannot be optimized due to lack of connectivity between the various components in supply chain.

Human System Interface: Poor HSI is a major contributor to data integrity problems in business systems supporting the Defense Transportation System. There is a need for intuitive HSI (e.g. artificial intelligence (AI), machine learning (ML) and cognitive computing (CC) technologies) that reduces cognitive workload and lowers data entry errors for planners/port operators. Edit checks and suggested data correction alerts connected to DOD data dictionaries are needed to improve HSI input.

Standardized Intermodal Containers/Pallets: Systems, including those that leverage AI/ML, that can be used by automated aircraft/ship loading/unloading systems, to include those designed to automatically scan standardized containers and pallets as they are on-loaded/off-loaded. Initiatives must be designed to increase cargo throughput by eliminating the requirement to handle cargo multiple times during shipping, reduce the requirement for multiple Materials Handling Equipment (MHE) systems, reduce need for additional ground personnel throughout the en route system, minimize the requirement to reposition MHE to support deployment/distribution, address pallet construction (current capabilities do not tie to shipments pallet break down, holding, frustration clearance, and costs), and improve the flexibility to be rapidly embarked on multiple expeditionary platforms.

Joint Deployment & Distribution Coordinator (JDDC)

Risk Assessment: There is a lack of available real-time risk assessment information for commanders and deploying units to rapidly determine acceptable levels of risk while en route to final destinations or to an intermediate staging locations. Interested in technologies, to include AI/ML enabled modeling of contested environment/attrition effects, to address this gap.

Adaptive Planning and Execution: The planning community requires trained personnel, well defined processes and the essential technologies, including AI/ML, to ensure DOD's ability to rapidly develop, assess, adapt and execute plans in a dynamic environment.

Knowledge Management: The operational and technical requirements of an effective near real-time global transportation network cannot be achieved through the application of legacy data-centric software design and development principles. Such a network calls for a degree of interoperability and a level of collaborative decision-support that is not available in any existing industry or government software environment of comparable scale. USTRANSCOM is looking to create an information-centric knowledge management layer on top of a data-centric Corporate Data Environment meta database layer.

Information Science and Technology: This area involves the maturing of technologies that support state-of-the-art capabilities for the Warfighter in the analysis, assimilation, and dissemination of real and simulated digitized battlespace information. Interests include, but are not limited to: artificial intelligence (AI), machine learning (ML), cognitive computing (CC), distributed ledgers, advanced cryptology, course of action analysis, transportation planning and feasibility, embedded training, optimization and resource allocation solutions, collaborative technologies for distributed work environments, and data visualization.

Project Selection Process

We go to great lengths to ensure only the most promising technologies are selected for funding. All projects selected must first provide a unique (non-duplicative), improved capability to the warfighter and/or enhance efficiency/effectiveness of the defense deployment and distribution system. Projects are selected on their validity as an RDT&E or Joint Capability Technology Demonstration (JCTD)/Emerging Capabilities & Prototyping effort, return on investment, joint application and ability to be transitioned into or become a Program of Record. The USTRANSCOM RDT&E project selection process ensures these criteria are met by an intense internal command-wide screening process followed by a review and vetting by the joint community to include the Services, CCMDs, Joint Staff, Office of Secretary of Defense and Defense Logistics Agency before final project approval.

More information on the project selection process and the proposal format can be found by visiting the program web site at <http://www.ustranscom.mil/cmd/associated/rdte/>, then click on References, and then open USTRANSCOM RDT&E Program Instruction 61-1.

Delivered Capabilities – Global Access



Joint Modular Intermodal Distribution System

- Developed a standardized container for use between conveyances
- 23% reduction in 20FT container requirement; 32% reduction in air pallets resulted in 50 fewer C-130 sorties/14 fewer C-17 sorties during operational user evaluation; \$16M annual cost avoidance in uni-pack use

Joint Recovery and Distribution System

- Produced a common Joint Cargo Handling System (truck family)
- Initial 75 missions in Afghanistan recovered >\$80M in vehicles and a \$200M C-17

Deployable Cargo Screener

- Developed to screen cargo pallets for explosives
- Technology leveraged by the Army and incorporated into a robotics system to detect improvised explosive devices

Leap Ahead Precision Air Drop Technology

- Produced multiple advanced guidance and airfoil technology initiatives to increase delivery accuracy
- Provided alternate navigation if GPS signals are being jammed and addressed the requirement to deliver when the signal is lost due to terrain features and masking

Joint Enabled Theater Access-Seaport of Debarkation

- Produced planning/decision support tool for analysis of austere ports locations for anti-access areas
- Produced lightweight modular causeway to support sea base to shore movement

Long Range Passive Radio Frequency Identification: Ability to read container tags 7X farther than industry standards (400% reduction in inventory execution cycle time; 50% reduction in stock position time)

Shipboard Selective Access and Retrieval System

- Adapted commercial air skid technology to move cargo and vehicles in a Large, Medium-Speed Roll-on/Roll-Off cargo hold in conditions up to Sea State 5 (increased stowage; greater onboard flexibility to reshuffle loads)
- Fueled the Dense Packed Access & Retrieval Transit JCTD

Large Vessel Interface-Lift-on/Lift-off

- Multi-phase effort that provided capability to conduct inter-ship transfer of fully loaded containers at sea in up to Sea State 4
- Navy demonstrated (May 2010) capability to transfer ½ loaded 20FT container
- Demonstrated (Spring 2013) the telescopic crane retrieval of container from ship's hold at sea
- Being leveraged by Navy to support vertical launch system at sea resupply

K-Max/Hummingbird

- Determined sling load characteristics, produced prototype spawned Autonomous Technologies for Unmanned Air Systems JCTD
- Initial flight Dec 2011; delivered > 4.2Mlbs of cargo (Feb 2014)
- Takes 4 trips to deliver same load as CH-53E with 80% lower maintenance and 50% lower operating costs

Autonomous Technologies for Unmanned Air Systems (ATUAS)

- Elements of ATUAS software currently in theater; transitioned to K-Max (enhancing on board mission management capabilities)
- Reduced need for truck convoys; enhanced ability to sustain troops in isolated/remote areas; added retrograde capability, precision landing and beyond line of sight control via autonomous beacon delivery system, dynamic re-planning & obstacle avoidance



Delivered Capabilities – Global Access

Joint Biological Agent Decontamination System: Provided a nearly 100% reduction of biological agents (including Anthrax) through the use of hot (170F) humid (90%) air on mobility aircraft

Joint Logistics Environmental Monitoring: Real-time monitoring and display system of local wave/current/wind conditions

Mission Planner

- Dramatically improved accuracy/operationalized capability
- 259 million pounds of cargo dropped in support of Operation Enduring Freedom/Operation Iraqi Freedom
- Solely supplied 42 forward operating bases/29,000 troops for 6 months

Wireless Gate Release System

- Doubled C-130 delivery capacity (cost avoidance in lower fuel and aircraft wear/tear associated costs)
- Eliminated bundle damage due to bundle mid-air collisions

High Speed Container Delivery System: 70% reduced exposure to ground threat (enhancing aircraft & aircrew safety); improved delivery accuracy within 50 meters of drop zone target

Guidance, Navigation & Control: Further improved delivery accuracy of airdrop supplies/equipment by incorporating terrain avoidance & guidance enhancements

Low Cost Low Altitude

- Reduced requirement for hazardous ground convoys; reduced airdrop retrograde recovery
- Increased cargo capacity by 1,500 pounds per pallet

Helicopter Sling Load for Joint Precision Air Delivery System (JPADS): New capability that allows delivery of JPADS payloads from the cargo hook of a helicopter

Humanitarian Operations Packaged Essentials

- Provided a rapid humanitarian aid response capability by the safe delivery of food and water via aerial delivery directly onto a population
- Life-saving supplies in the first days after a humanitarian disaster

Autonomous Mobility Applique System (AMAS)

- Equipped existing military ground vehicles with scalable modes of robotic technology through the integration of modular kits, common interfaces, and a common architecture.
- Provided an optionally manned capability to increase safety and provide the warfighter with additional flexibility in how assets
- 26-59% reduction in casualties due to truck related accidents

Driver Assistance for the Rough Terrain Container Handler

- Reduced the soldier workload associated with moving containers at sustainment nodes throughout the military
- Automated the most technically challenging aspect of container movement, the picking and placing operation

Traffic Engineering Research

- Researched, physically tested and analyzed data for improving Entry Control Facilities (ECF)
- Reduced threat vehicle speeds through design changes at military ECF
- Reduced construction costs, prevents or decreases accidents, saves lives, minimizes lost time, minimizes vehicle emissions, and maintains readiness

Delivered Capabilities – C2/Cyber/Decision Support



Global Mission Scheduling

- Fine-tuning and pairing of air movement requirements and resources – transitioning into Consolidated Air Mobility Planning System (CAMPS)
- Projected cost avoidance in fuel alone > \$25M/year

Coalition Mobility System

- Provided visibility and supports scheduling of coalition movements
- Annual \$2.3M cost avoidance (flying hours saved by utilizing coalition assets and more efficient use of U.S. assets)

Transportation Tracking Number

- Created a FedEx-like commodity tracking number to increase end-to-end visibility of transportation requirements
- Significantly reduce re-ordering errors, reduce costs and enhance warfighter confidence

Node Management and Deployable Depot

- Deployed in support of Hurricane Ike – processed 4,000 truck loads of meals and ice
- Fielded Defense Logistics Agency's (DLA) Deployable Depot to manage in-theater logistics
- Reduced military inter-theater airlift for DLA managed items and cut Customer Wait Time by 45%

Expeditionary Theater Distribution: Produced next-generation Portable Deployment Kit improving security, communications, expanding capabilities, and reducing overall weight by ~50%

Identity and Access Management: Addressed credential management and developed a strategy for improvement

Sustainment Planning and Optimized Resupply in Theater

- Provided a theater-wide bulk fluid rapid planning capability supporting conveyance-based (ground, air) and non-conveyance-based (pipeline/hoseline) delivery Courses of Action
- Enhanced mobility and improved logistic response times

Class IX Demand Forecasting for Sustainment/Distribution

- More accurate demand forecasting to provide the “right parts, to the right place, at the right time
- Savings of 1-3% for top 20% of parts through information sharing

Collaborative Operational Picture - Deployment & Distribution

- Provided single sign on capability (i.e., ability to have one sign on to access multiple disparate distribution IT systems...saving man-hours and reducing confusion)
- Launched distribute.mil

Operationalizing Cyber Security

- Assesses and aligns people, processes, and tools to support cyber-security operations, plans, organizational procedures, and infrastructure requirements to enable operational threat protection
- Improvement in the Command's cybersecurity capabilities helps better inform USTRANSCOM IT investment decision making

Joint Transportation Asset Scheduling Kit

- Automated scheduling of Joint Operational Support Airlift Center missions supporting United States Northern Command requirements
- Reduced schedule generation time – 50 requirements scheduled in ~10 minutes
- Produced complete schedule in 2 hours rather than 1+ days



Delivered Capabilities – C2/Cyber/Decision Support

En Route Trauma Patient Care Module

- Army Surgeon General, National Air and Space Agency and USTRANSCOM collaboration that provided enhanced/continuous patient care & monitoring (from the battlefield to definitive care)
- More efficient use of liquid oxygen supply (saving DOD millions)

Strategies for Enterprise Meta Data Management

- Developed a meta data management strategy that defined a foundational enterprise-wide big data analytic path way
- Identified potential cost reductions from better data sharing and compliance

End-to-End Deployment and Distribution Modeling:

Optimized the scheduling and delivery of forces, sustainment, and personnel across hundreds of deployment and distribution nodes (cost avoidances range between 19% to 37%)

Total Transportation Feasibility Model

- Provided full-spectrum transportation adaptive planning and analysis in a collaborative, web-accessible, service-oriented environment
- Transitioned into Joint Flow & Analysis System for Transportation

Distribution Performance Nodal Model

- Developed a highly configurable model to express and analyze complex/detailed business processes within distribution nodes
- Enhanced ability to conduct programmatic distribution analysis
- Transitioned into Analysis Mobility Platform (AMP)

Auto Response to Unexpected Events

- A domain-independent autonomous agent to reason about what goals to pursue in response to unexpected port events
- Transitioned into Integrated Computerized Deployment System

Single Load Planning Capability

- Provided a collaborative info workspace where incoming cargo can be dragged and dropped into load plans for follow-on conveyance
- Transitioned into Intelligent Road Rail Information System

Next Generation Autonomic Logistics

- Monitor/report maintenance status of combat assets in tactical operations; distribution demand forecasting/execution monitoring tools
- Timely tactical logistics demand data “injected” into operational and strategic level distribution systems – 53% reduction in time required to process class IX requisitions
- Fueled expanded Army, United States Marine Corps, and USTRANSCOM Predictive Analysis initiative designed to provide more accurate (30/60/90 day) needs forecasts

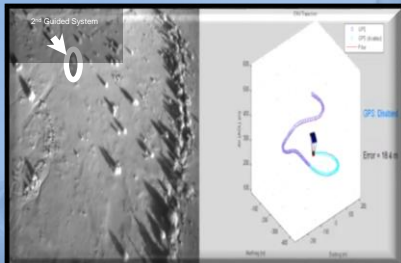
Predictive Maintenance

- Forecasted parts/supplies and maintenance requirements of tactical equipment
- Allowed coordinated decision making across the tactical, operational and strategic levels

Support Planning for Aerial Refueling

- Enables planners to optimize the use of the worldwide aerial refueling fleet while maintaining or increasing operational effectiveness, agility and capacity
- Transitioned into AMP

Current Initiatives – Global Access



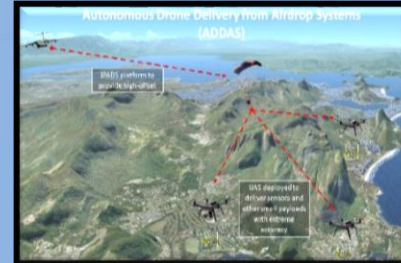
Enhanced Visualization for JPADS

Guidance software enabling precision guidance of airdrop bundles in areas of denied Global Positioning System information



Precision On-Demand Aerial Resupply

Provide the remote/austere isolated joint warfighter an on demand resupply capability



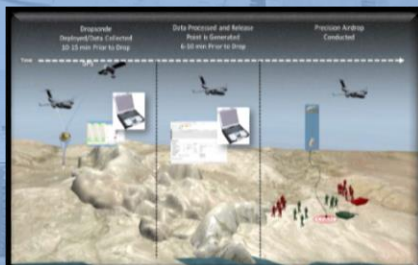
Autonomous Drone Delivery from Airdrop Systems

Develop air-droppable unmanned air system capability for resupply in densely populated urban areas



Use of Dual Row Airdrop System with Joint Light Tactical Vehicle

Triple the C-17's ability to airdrop heavier weights (i.e., JLTV) using current logistics rail system



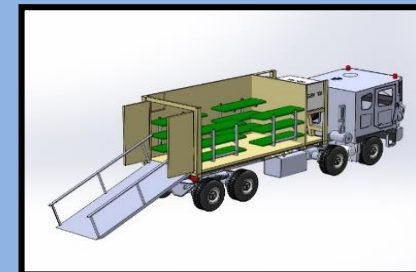
Dropsonde Optimization

Pursue single pass airdrop capability to enhance the safety of delivery aircraft, crew, and ground recovery personnel



60K Autonomous Loader Turner

Automation of driving and cargo movement in aerial ports to improve safety and increase workload



Interoperable Multi-Modal Patient Movement

Mobile medical facility to support mass patient evacuation



Current Initiatives – Global Access



Expeditionary End-to-End Fueling Concept

Modular pumping, hose and reel system to enhance over-the-shore & inland fuel distribution and inform future Service system development



Preamble Initial Look Leading to Accelerated Results/Port Improvement via Exigent Repair

Provide the capability to rapidly assess and repair a damaged pier



Resilient Expeditionary Agile Littoral Logistics

Enhance ability to conduct littoral fuel/cargo resupply



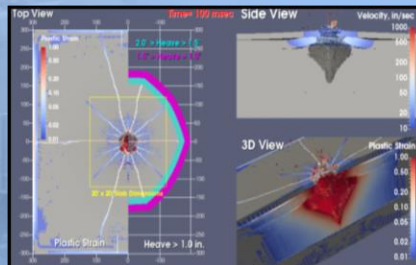
Replenishment from Ships to Point-Of-Need Delivery

Ship launched autonomous system capable of delivering 4000 lbs of fuel or supplies 100 miles



Mini-Robotic Dredge

Expeditionary dredging capability to support improved access to the shore



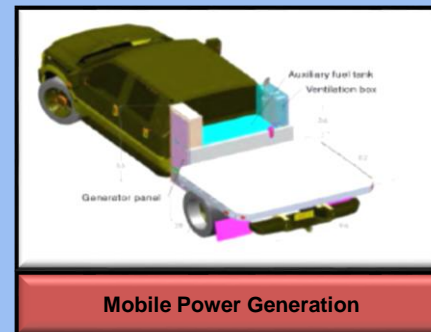
Expedient Airfield Damage Repair

Expedient repair capability for munition-damaged aircraft surfaces to support rapid recovery



Unmanned Logistics System - Air

Competitive assessment of varying unmanned air system capabilities to support last tactical mile distribution



Mobile Power Generation

Demonstrate a variable output power generation prototype 1/4 the size of current generators to enhance deployability



Current Initiatives – C2/Cyber/Decision Support



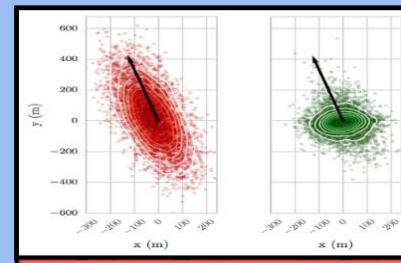
End-to-End Deployment and Distribution Modeling

Series of projects to enhance transportation/distribution modeling and analytics to assess plausible attrition effects/impacts to the warfighter



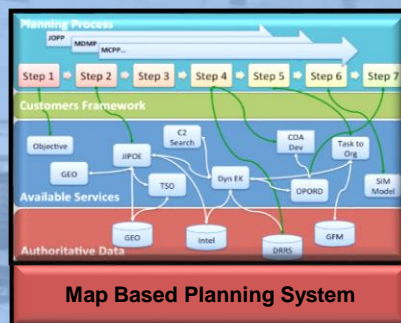
Advanced Planning for Global Response Force (GRF)

Provide joint warfighting planners the ability to plan/execute a GRF mission



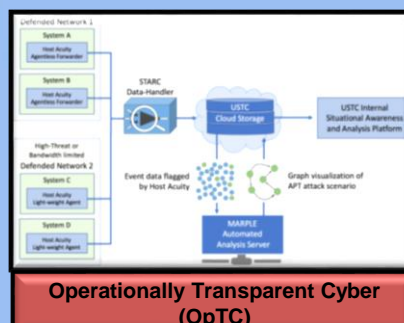
Optimized High Altitude Low Opening Delivery Planning

Demonstrate low-cost/low-complex solution to deliver payloads at improved accuracy



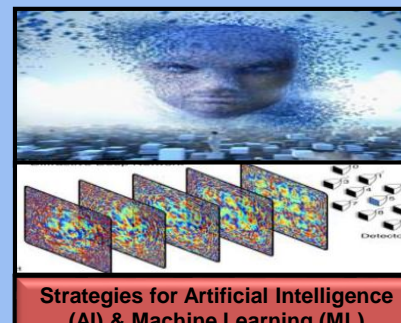
Map Based Planning System

Collaborative geospatially enabled capability for CCMMD planners to rapidly develop multiple courses of action, model and simulate plans, to conduct deliberate planning



Operationally Transparent Cyber (OpTC)

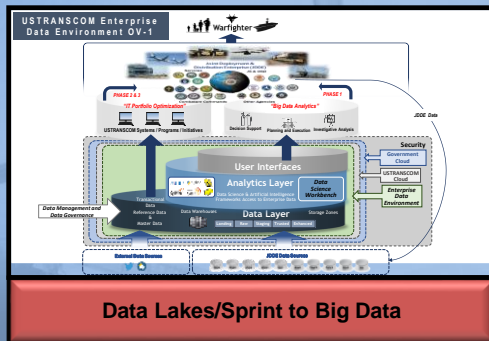
Rapidly eliminate malicious actor behavior and defend against Advanced Persistent Threats in near real-time



Strategies for Artificial Intelligence (AI) & Machine Learning (ML)

Enhance logistics support via the application of AI/ML to increase the effectiveness and value of Big Data

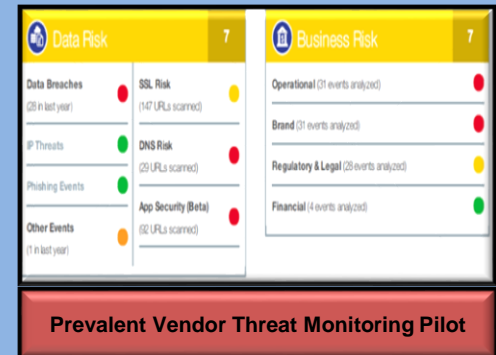
Current Initiatives – C2/Cyber/Decision Support



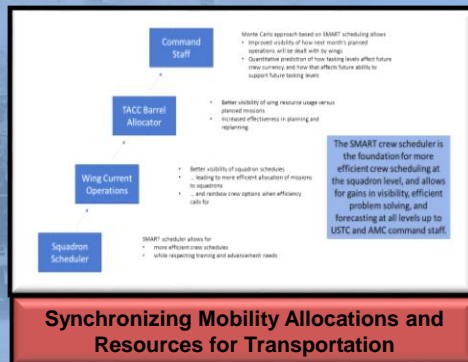
Explore how big data and data lake technologies can be applied to the deployment/distribution enterprise to enhance decision support



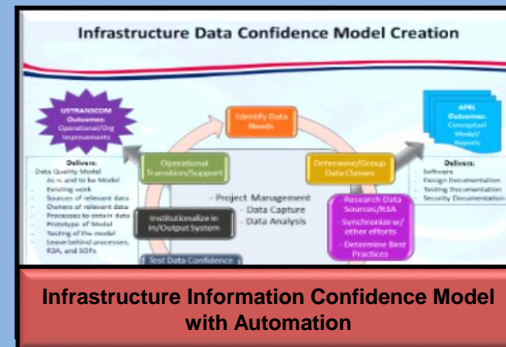
Select student research/faculty led research at Air Force Institute of Technology, Wright Patterson Air Force Base



Provide command visibility of “fourth component” to enable informed decisions regarding capacity utilization and readiness



A predictive modeling and simulation based air crew utilization forecasting tool



Information collaboration process that analyzes and provides a confidence assessment of structured and unstructured data



USTRANSCOM TECHNOLOGY TRANSFER (T2)

USTRANSCOM uses T2 mechanisms of the federal laboratories to facilitate voluntary collaboration by experts from government, industry, and academia, revealing costs and benefits of innovations to understand the feasibility of future capabilities.



Concept of Operations for Unpiloted Cargo Air Vehicles



Concept of Operations and Lifecycle Costs for Hybrid Airships



Physical and Cyber Resilience Techniques for the DOD Supply Chain



Blockchain Techniques for Supply Chain Transaction Assurance



Global Cargo Tracking with Opportune Cellular Networks

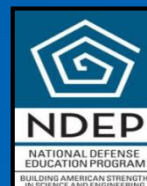
Collaboration Across Federal Labs



Exploring Future Capabilities

- Collaborate with experts
- Team with academia and industry
- Develop new concepts
- Explore innovations
- Understand tech readiness levels
- Apply and mature new techniques
- Build Public-Private Partnerships
- Create Concepts of Operation
- Scope costs/benefits/ROI
- Develop/share intellectual property
- Patent, trademark, copyright
- License/commercialize technologies

Science Technology, Engineering and Mathematics (STEM)



Performance Assessment of Portable Gapfiller Radars in Wind Farm Regions



Multi-Mission Logistics Vessel Concept



Employment of War Risk Insurance



Identify Safety Trends and Indicators in AMC Flight Data



Additive Manufacturing for Mobility Aircraft Maintenance



FAR-TERM TECHNOLOGY FOCUS



Future Deployment and Distribution Assessment (FDDA)

Purpose: FDDA is a perennial research and analysis effort to assess and catalog needed deployment and distribution capabilities and the solutions that may provide those capabilities in the extended planning period and beyond

Objectives

- Synthesize and vet future capability gaps in the Joint Deployment and Distribution Enterprise (JDDE)
- Identify solutions that fill gaps or offer leap-ahead improvements in deployment and distribution capabilities
- Evaluate the utility of materiel solutions, technologies, and S&T initiatives in support of transforming forces and operational concepts
- Provide a forum and a process to shape efforts that enhance JDDE capability

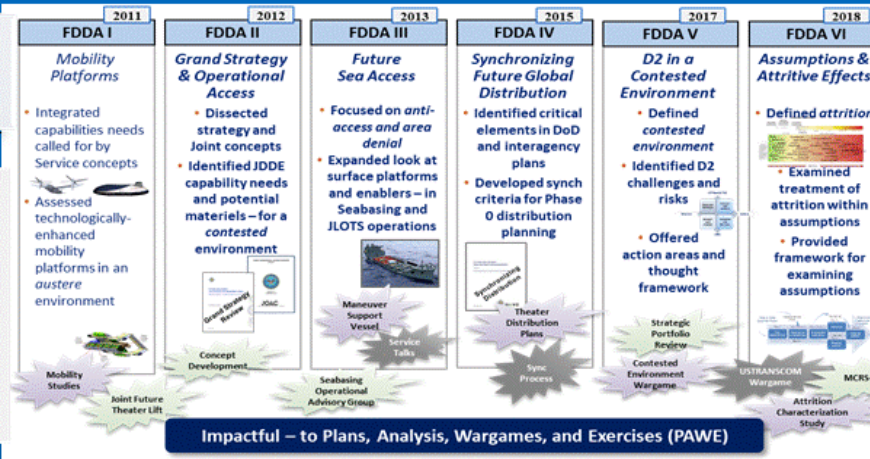
Community of Interest

Members

- Standing
 - Principals and Stakeholders
 - Represent the JDDE and S&T activities
- Ad-hoc
 - Represent industry and academia
 - Serve as SMEs

Principals

- USD(A&S)
- USD(R&E)
- DUSD(SPF)
- CAPE
- DLA J3
- JS J4
- CCMD J4s
- Service 4s
- USTC J5/4
- USTC JDPAC



FDDA VII

2018-2020



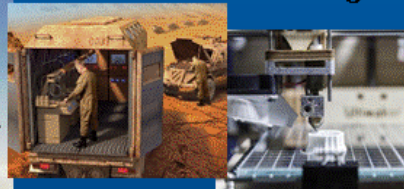
ARTIFICIAL INTELLIGENCE

Undersea drones



Stealth Tanker

Additive Manufacturing



Cargo through space



USD(A&S): Under Secretary of Defense for Acquisition & Sustainment, USD(R&E): Under Secretary of Defense for Research & Engineering, DUSD(SPF): Deputy Under Secretary of Defense for Strategy, Plans and Forces, CAPE: Office of Cost Assessment and Program Evaluation, DLA: Defense Logistics Agency, CCMD: Combatant Command, JDPAC: Joint Distribution Process Analysis Center, JLOTS: Joint Logistics Over the Shore, D2: Deployment and Distribution

Handbook Back Cover

HOW TO CONTACT US

For more about the USTRANSCOM RDT&E Program, please contact the program team at
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Also take a moment to check out our web site.
<http://www.transcom.mil/cmd/associated/rdte/>